

which resist tensile (longitudinal) loads. The well-known solution to the problem of tensile load is to add external armoring layers helically wound around the umbilical. However, as explained on page 2, the conventional armor layers increase the external diameter of the umbilical and correspondingly increase the hydrodynamic load. The present invention avoids these disadvantages by employing internal steel rods which do not merely occupy space in the interior of the umbilical, but also absorb tensile loading on the umbilical.

Carroll suggests no such rods. As the Examiner pointed out, the Carroll reference discloses the use of steel wound at a short pitch around the core for resisting transverse loads, namely torque and crushing loads. This reference is no more relevant than the Admitted Prior Art. If subjected to tensile load, the steel in Carroll would merely act as a spring. It would elongate without resisting the tensile load. A skilled individual would obtain no idea from the steel disclosed in Carroll that a steel rod could be used to resist tensile loading. Despite the steel already present in Carroll's umbilical, if a skilled person desired to increase tensile strength, he would realize that Carroll's steel added no tensile strength and would instead add the conventional external armor layers.

In all of the art of record, including Bierkelund et al., Carroll, and the other art, the only measure for resisting tensile loads is to include in the umbilical at least one layer of armoring wire. None of the prior art describes or suggests an umbilical with a steel rod which resists tensile loads and is arranged in a void between the other internal elements of the umbilical as claimed in claims 1 and 6. For at least these reasons, claims 1 and 6 and their dependent claims are allowable over the art of record.

Claims 4 and 9 have been rewritten in independent form. Each of these claims recites that the at least one steel rod "is in direct contact with said non-metallic outer sheath." Carroll's steel rod is not in direct contact with an outer sheath, and therefore, the art of record fails to present a prima facie basis for a rejection of claims 4 and 9, which are requested to be allowed.

Further, new claims 12 and 13 depend from claims 4 and 9, respectively, and recite the feature of claims 1 and 6 that the at least one substantially solid steel rod resists tensile loading.

For the reasons discussed above, claims 12 and 13 should be allowed as well.

In view of the foregoing amendments and remarks, allowance of claims 1-13 is requested.

I hereby certify that this correspondence is being transmitted via facsimile # 703 872 9318 to: Asst. Commissioner for Patents, Washington, D.C. 20231, on January 4, 2002.:

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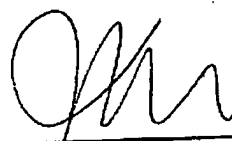
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January 4, 2002

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